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Statement of

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Administrator

National Aeronautics and Space Administration

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Subcommittee on Science, Technology and Space
Committee on Commerce, Science, and Transportation
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Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity this morning to review with you the potential development by the United States of a space station in permanent orbit around the earth. Such a station is currently the subject of discussion within the Administration, so your hearings today are both timely and welcome.

For the past eighteen months, following the successful flights of the Space Shuttle, NASA has conducted preliminary definition efforts in support of future decisions regarding a space station program. These efforts are relatively modest in scope and will be presented to you by Mr. John Hodge, the Director of NASA's Space Station Task Force.

Earlier this year, President Reagan requested an interagency study to establish the basis for an Administration decision on whether to proceed with development by NASA of a permanently-based, manned space station. The analysis was to address issues relating to leadership in space, fulfilling mission requirements, foreign policy and national security implications, and economic impacts. Participating in the study were NASA, the Department of Commerce, the Department of State, the Department of Defense, the Arms Control and Disarmament Agency, and the Office of Science and Technology Policy. The study, which took place over the spring and summer, is now complete. A space station is a major policy decision that will shape the future of our activities in space. Accordingly, it is presently under review at senior levels within the Administration. No decision has yet been made.

Mr. Chairman, in your letter of invitation to appear before you today, you asked that I assess the uses of a space station. Based upon our own analysis and that of our industry contractors, it is clear that a space

station could serve a number of functions. Properly conceived, a station could function as:

- o a laboratory in space, for the conduct of science and the development of new technologies;
- o a permanent observatory, to look down upon the Earth and out at the universe;
- o a transportation node where payloads and vehicles are stationed, processed and propelled to their destinations;
- o a servicing facility, where these payloads and vehicles are maintained and if necessary repaired;
- o an assembly facility where, due to ample time on orbit and the presence of appropriate equipment, large structures are put together and checked out;
- o a manufacturing facility where human intelligence and the servicing capability of the station combine to enhance commercial opportunities in space; and
- o a storage depot where payloads and parts are kept on orbit for subsequent deployment.

Perhaps more important than any of these individual points, however, is my belief that a space station could also lead to important activities and functions that we presently can not even predict today. Were NASA to have a station, it could represent a fundamentally new and versatile capability to support activities in space over the next thirty years.

Mr. Chairman, your letter of invitation also requested that I comment on alternative approaches that would satisfy the requirements of a space station.

Many of the functions of a potential space station, I outlined just a moment ago, could be performed by other means. Over the past twenty years, NASA has examined a broad spectrum of space station concepts. These have included both manned and unmanned configurations. An unmanned space platform in itself, for example, could be a useful asset for space science and applications. We have studied such a platform and have a solid understanding of its potential capabilities.

Over the past several years, we have also looked at the potential for extending the time on orbit of the Shuttle orbiters. Presently, we have underway a further study of the potential of an extended duration orbiter which we hope to complete soon. The duration on orbit for Columbia and her sister ships is currently about nine days. Analysis suggests that this can be extended to about 14-21 days without substantially modifying the basic orbiter design. I suspect that an extended duration orbiter is a useful project to undertake, on its own merits, as part of the overall Space Shuttle program. Going much beyond 21 days, however, might require recasting many of the orbiter's basic systems. This could require significant funding and

would produce only a modest increment of capability. Thirty days of stay-time would be a valuable addition to the Shuttle's capabilities and there is no doubt that we could devise new and useful projects to take advantage of it. However, the capabilities of an extended duration orbiter would clearly be more limited than what a space station would provide.

At this point, it might be appropriate to comment conceptually on what NASA has in mind when we talk about a space station. I say "conceptually" because we do not have a space station design. You may have seen some illustrations of a station, and while these are nice pictures, they do not represent a NASA configuration. A space station is conceived as a multi-purpose, permanent facility in low-earth orbit, comprising both manned and unmanned elements, that significantly enhances the efficiency of our operations in space. The station could consist of a manned base and associated unmanned platforms. These platforms, there might be only one to start with, would be discipline oriented and be tended from the base by a Orbital Maneuvering Vehicle (OMV) or by astronauts conducting Extra Vehicular Activity (EVA). A tether could also possibly be employed.

The base, as currently conceived, is a cluster of functionally oriented modules. The key elements as we presently define them--and I hasten to add that these elements, as well as costs, may change as our thinking progresses--include a utility module to provide essential services such as power and thermal management to the cluster, a berthing and assembly module, a module for living and a laboratory module for working, a logistics module for supply and replenishment, and pallets or platforms to which are attached scientific instruments and repair equipment for both the base and the platforms. The base would be tended by the Space Shuttle.

The space station could be conceived from the start as a system that could evolve into a more capable system. NASA would propose that the first phase be useful in its own right, but it would be relatively small, costing approximately \$8.0 billion through 1991 when the station would become operational. Later, as requirements emerge and funds permit, the station could--if the country wished--expand into something more capable.

Our concept of a space station encompasses both manned space flight and unmanned spacecraft. The station would employ astronauts in tasks and roles where the presence of man is uniquely valuable. Our experience and our intuition tell us that man has a part to play in the operation of certain elements of a space station. At the same time, we realize that under some circumstances certain activities, particularly those of a routine nature or those that can be programmed in advance, are better suited for automated systems. The challenge for NASA would be to design a space station that achieves the best of both modes. We must find the proper mix of man and machine.

The Soviet space station, Salyut, provides a major role for man in space. The cosmonauts perform a wide variety of tasks--in terms of both monitoring and maintaining the station itself and of operating its many payloads.

The Salyut now in orbit is the seventh in a series of stations, the first of which was launched in 1971. At an altitude of some 175 miles and an orbital inclination of 52°, the station orbits the earth every 91 minutes overflying the United States five or six times a day.

Salyut 7 is a genuine space station. True, it is small and in some areas employs technology clearly inferior to our own. But manned space flight requires a base level of competence which the Soviets have clearly acquired.

What concerns me about the Salyut program is not so much Salyut 7, although we should take notice of the payload capabilities and operational procedures the Soviets are developing with Salyut 7 and its predecessors, particularly Salyut 6, but rather what station will follow Salyut 7, what kind of facility the cosmonauts will be occupying during the 1990's, and what exactly will they be doing in space at this time. The Soviets have said that they intend to develop a large, permanent space station. What have they learned from the Salyut program that leads to such an objective?

The National Space Policy announced by President Reagan in July 1982, provides a road map for our activities in space. The policy establishes the basic goals of our space programs, which are to:

- o strengthen the security of the United States;
- o maintain United States space leadership;
- o obtain economic and scientific benefits through the exploitation of space;
- o expand United States private sector investment and involvement in civil space and space related activities;
- o promote international cooperative activities in the national interest; and
- o cooperate with other nations in maintaining the freedom of space for activities which enhance the security and welfare of mankind.

I believe a space station could contribute significantly to these goals.

Civil leadership in space means preeminence in space technology, preeminence in manned space operations and preeminence in space science and applications. At a time when U.S. leadership is at issue in certain disciplines of science and in a number of industries, our preeminence in space is a welcome and reassuring reminder of our capacity to lead. It is my belief that a space station could represent a factor in the preservation of civil leadership in space during the 1990's.

Already economic benefits accrue to the United States from the exploitation of space. The communications industry is in large part space-based, which is responsible for improved service at lower cost. This was made possible by Federal research to develop the initial technology, to reduce the

risk to an acceptable level thus enabling private venture capital to launch a now highly successful business enterprise. I believe a space station could do the same for the field of materials.

Benefits to the United States also accrue from the science we conduct in space. Knowledge of the earth and a greater understanding of our own solar system and the many galaxies of the universe result from the scientific spacecraft we have placed in orbit and sent out to our sister planets. A space station could be a valuable addition to the Nation's scientific assets. A space station could enhance space science and applications by providing for the continuous operation of scientific equipment, with extensive interaction with man where that is desirable and with intermittent interaction with man where his continuous presence in the laboratory is not required.

The President's National Space Policy reaffirms the goal of promoting international activities in space where these activities are in the national interest. This reenforces a NASA objective mandated by Congress with the passage of the Space Act in 1958. The numerous successful projects NASA has conducted with other nations attest to the wisdom of the directives.

In many instances, foreign aerospace capabilities are now fully mature and competitive with those of the United States. Thus other nations could make genuinely significant contributions to a United States space station, were we to embark upon such a program. These contributions, if determined to be appropriate, would have the effect of adding to the station's capabilities at no additional cost to the U.S. Treasury.

In the past year, we have seen significant self-generated foreign interest in our space station definition planning activities. Several countries, while realizing that there was no approved U.S. program and no commitments, have spent their own funds on parallel station studies, and have shared their results with us.

Any cooperative venture on a future space station would need to guard against the unwarranted transfer of U.S. technology to our competitors abroad. Technology, particularly aerospace technology is an area of strength for the United States in what is now an intensely competitive world. Markets are global and we must not make it easier for those whose products compete with our own to gain a competitive advantage. With care and common sense, we can continue the benefits provided by international cooperation in space yet accommodate legitimate concerns with technology transfer.

Mr. Chairman, as we have conducted our space station planning activities, we have sought to involve those communities who might take advantage of the capabilities a space station would offer. This involvement has included the Department of Defense. The Department contributed funds to the mission studies and has provided an officer from Space Command to the Space Station Task Force. This cooperation has been, I believe, mutually beneficial. In addition, the Department has conducted some space station studies of its own. I believe that it is most important for NASA and the Air Force and Department of Defense to keep each other well informed of our space station planning activities.

In the future NASA hopes to increase the benefits our many activities in space provide. These activities, in science and applications, in launch vehicles, in technology and in the area of commercial endeavors offer tremendous potential for the years ahead. I foresee a future in which we will have on orbit large astrophysical observatories, where we have over time built up a system of earth-looking imaging systems, where a stable planetary program results in periodic missions, and where commercial endeavors in space are significant in both number and benefit. Such a future could reflect an infrastructure with the following characteristics:

- o the ability to assemble large structures;
- o improved transportation from low-Earth orbit to geosynchronous orbit;
- o on-orbit flexibility in maintenance and repair;
- o suitable accommodations for living and working in space;
- o removal of the mystique associated with manned space flight.

These are all characteristics or capabilities associated with a potential future space station. In the long run, a space station would help establish this infrastructure and preserve future options for a truly major new national endeavor in space. It could be a stepping stone to future space exploration.

That concludes my prepared statement this morning. In the time remaining I will try to answer any questions that you may have.